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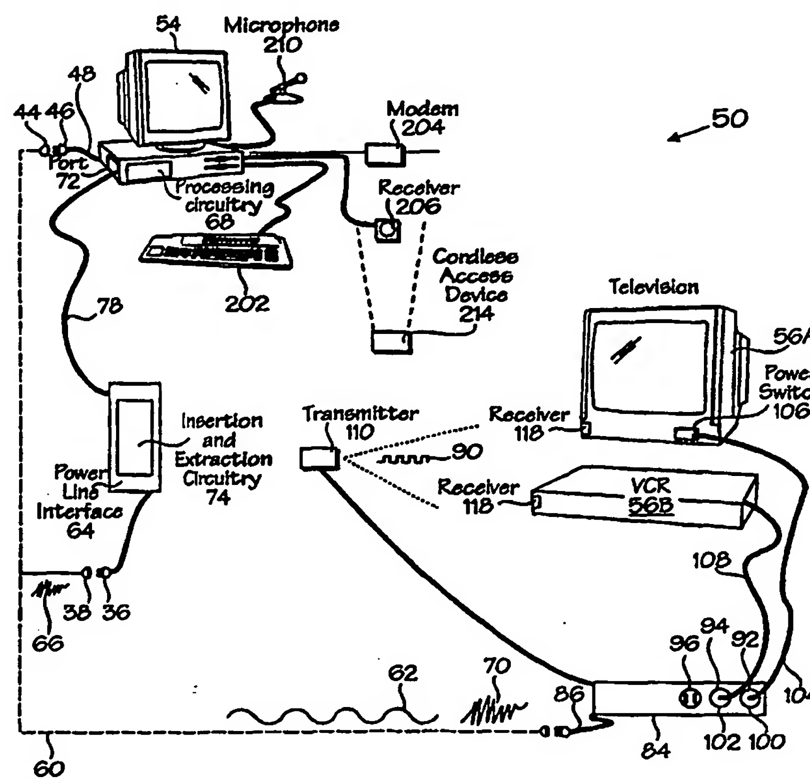
(54) Title: CONTROL SYSTEM INCLUDING CIRCUITRY TO DETERMINE A POWER STATE

(57) Abstract

A control system (50) includes remote computer circuitry (54) that controls at least one feature of an electronics device (56A), such as a television, through local control circuitry. The remote computer circuitry (68) and local control circuitry are separated from each other by a communication medium (60), such as a power line. Power is selectively provided to the electronics device (56A) through a conductor (86) connected to the power line. Power consumption sensing circuitry provides a power state signal indicative of whether the power signal is being provided through the conductor to the electronic device. Current monitoring circuitry may be used. Local control circuitry creates power state information indicative of the power state signal. In many cases, a different command will be given to control an electronic device (56A) that is on, than will be given to control the same electronic device (56A) that is off. The power state information is considered in selecting commands. In one embodiment, the power state information is considered by the remote computer circuitry (68). In another embodiment, the power state information is considered by the local control circuitry. The remote computer circuitry (68) may employ voice recognition circuitry and/or an electronic program guide to control a cluster of consumer electronic devices.



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CONTROL SYSTEM INCLUDING CIRCUITRY TO DETERMINE A POWER STATE

Background of the Invention

Technical Field of the Invention: The present invention relates to a computerized system to control an electronics device and, more particularly, to such a system that monitors the power state of the electronics device and considers the power state in remotely controlling a feature of the electronics device.

Description of Related Art: Referring to FIG. 1, a control system 10 includes a personal computer 14 which remotely controls at least one feature of an electronics device 16 through a power-line carrier (PLC) communication signal 20 on a standard power line 22 (shown in dashed lines). Power line 22 is of the type typically included within the walls of houses and buildings. Power line 22 receives a sinusoidal power signal 24 from an outside power source (not shown). Although communication signal 20 and power signal 24 are illustrated at different portions of power line 22, they both are transmitted throughout power line 22.

Communication signal 20 is provided to power line 22 through a power line interface 26. Power line interface 26 is connected to personal computer 14 through a conductor 32 and a port 34, such as an RS-232 port or a universal serial bus (USB) port.

Power line interfaces and communication signal transmitted thereby are well known. For example, a Consumer Electronics Bus (CEBus) defines a standard for hardware and signals used in PLC communications. A variety of products related to PLC communications are available through X-10 (USA), Inc.,

91 Ruckman Road, Closter, New Jersey, 07624, and X-10 Pro, 10014 N. Dale Mabry, Suite 222, Tampa, FL 33618.

Personal computer 14 receives power signal 24 through a socket 44, plug 46, and conductor 48. Electronics device 16 may receive power signal 24 through circuitry 40 or through a separate conductor, similar to conductor 48. Power line interface 26 connects to power line 22 through a plug 36 and a socket 38.

Electronics device 16 may include a variety of devices including a thermostat, a light, and a vent. Circuitry 40, which may include a switch, responds to a particular communication signal. As an example, electronics device 16 may include a light. When it is desired that the light be turned on, personal computer 14 transmits an electrical signal through conductor 32 to power line interface 26. In response thereto, power line interface 26 provides an appropriate communication signal 20 over power line 22 that controls a switch in circuitry 40 to turn on the light.

In cases where a switch of circuitry 40 is controlled only by personal computer 14, personal computer 14 will always know the state of the switch. However, personal computer 14 might not know the state of the switch in cases in which a person or device other than personal computer 14 may control the state of the switch. For example, if a switch to turn a light on or off may be controlled either manually or by personal computer 14, absent some auxiliary means, personal computer 14 would not know whether the light is on or off. In some situations, more than one switch controls the state of a device. For example, an electrical light may be controlled by two switches. Therefore, activating one of the two switches may turn the light on or off depending on the state of the other switch.

Further, some switches do not have any outwardly physical indication of their state or whether power is being conducted. For example, electrical power toggle switches are typically included in televisions and VCRs. The television is turned on by pressing the switch. However, the television is also turned off by pressing the switch. In addition, the television may be turned on and off through an infrared (IR) remote control device without manual activation of the switch.

Personal computer 14 may be programmed to turn on electronics device 16 at a particular time. However, when personal computer 14 does not know whether electrical device 16 already is on, activation of the switch may turn electronics device 16 off, when it was intended that electronics device 16 have been turned on or remain on.

Accordingly, there is a need for system that indicates the power state of an electronics device to a remote computer so that the power state may be considered in controlling a feature of the electronics device.

Summary of the Invention

The present invention relates to a system for controlling a feature of an electronics device which selectively receives a power signal through a conductor. The system may includes power consumption sensing circuitry to provide a power state signal indicative of whether the power signal is being provided through the conductor. Local control circuitry receives the power state signal and creates power state information indicative of the power state signal. The local control circuitry may provide a feature controlling signal to control the feature of the electronics device. In one embodiment of the invention, remote computer circuitry receives the power state information from the local control circuitry.

The remote control circuitry considers the power state information and provides a remote communication signal to the local control circuitry including an instruction instructing the local control circuitry to provide the feature controlling signal for controlling the feature.

In another embodiment of the invention, the remote computer circuitry provides a remote communication signal to the local control circuitry including an instruction instructing the local control circuitry to provide the feature controlling signal, and the local control circuitry considers the power state information in determining how to respond to the instruction.

An optional and additional aspect of the invention is a power strip assembly used in a system for controlling a feature of an electronics device. The power strip assembly may include the power consumption sensing circuitry and the local control circuitry.

Brief Description of the Drawings

FIG. 1 is a schematic block diagram representation of a prior art system including a personal computer electrically coupled to an electronics device through a power line interface.

FIG. 2 is a schematic block diagram representation of a control system according to the present invention that includes a power strip assembly.

FIG. 3 is a block diagram representation of components in one embodiment of the power strip assembly of FIG. 2.

FIG. 4A is a block diagram representation of a first embodiment of comparing circuitry in FIG. 3.

FIG. 4B is a block diagram representation of a second embodiment of comparing circuitry in FIG. 3.

FIG. 4C is a block diagram representation of a third embodiment of comparing circuitry in FIG. 3.

FIG. 4D is a block diagram representation of a fourth embodiment of comparing circuitry in FIG. 3.

FIG. 5A is a block diagram representation of an alternative embodiment of some components in the system of FIG. 2.

FIG. 5B is a block diagram representation of an additional alternative embodiment of some components in the system of FIG. 2.

FIG. 5C is a block diagram representation of another alternative embodiment of some components in the system of FIG. 2.

FIG. 5D is a block diagram representation of still another alternative embodiment of some components in the system of FIG. 2.

FIG. 5E is a block diagram representation of yet another alternative embodiment of some components in the system of FIG. 2.

FIG. 6 illustrates multiple remote computers and multiple electronics devices at remote positions.

Detailed Description of Preferred Embodiments

Referring to FIG. 2, a control system 50 includes remote computer circuitry 54, which is illustrated as a personal computer, but may be any of a variety of other computers. Remote computer circuitry 54 controls at least one feature of an electronics device. The electronics device may be any of a wide variety of electronics devices including a consumer electronics (CE) device. For

example, as illustrated in FIG. 2, electronics device 56A is a television and electronics device 56B is a VCR (which plays and/or records video tapes). The particular features to be controlled vary depending on the electronics device. However, such features could include those typically controlled by an IR remote control devices commonly used in connection with VCRs (e.g., "on", "off", "channel select", "volume increase", etc.), as well as various other features. It is expected that the invention would typically be used to control multiple features of an electronics device.

Remote computer circuitry 54 is referred to as "remote" because it is separated from the electronics devices by a power line 60, which may be the same as or different from power line 22 in FIG. 1, or by another communication medium such as a path through air for an electromagnetic transmission or a conductor that does not carry a power signal. Power line 60 provides an electrical power signal 62 to electronics devices 56A and 56B, as described in greater detail below. Power signal 62 may be a standard 60 Hz, 120 volt alternating current (VAC) signal (the same as power signal 24 in FIG. 1), or any of various other signals including signals having a different frequency, a three phase arrangement, or a higher voltage. Power line 60 also provides power signal 62 to remote computer circuitry 54 through conductor 48.

In a preferred embodiment of the invention, a power line interface 64 is connected to processing circuitry 68 of remote computer circuitry 54 through a port 72, such as an RS-232 or USB port. Power line interface 64 includes signal insertion and extraction circuitry 74 that inserts one example of a remote communication signal 66 (that may include an instruction /or a query) onto power line 60 and extracts an example of a local communication signal 70 (such an

information signal) from power line 60. Remote communications signal 70 may be a control signal. The term "local" refers to something on the opposite side of the communication medium from remote computer circuitry 54. Various techniques may be used to insert or extract signals, including but not limited to techniques under the CEBus or X-10 protocols.). Signal insertion and extraction may involve modulation and demodulation. The particular characteristics of remote and local communication signals 66 and 70 vary depending on the protocol selected and the particular command or information transmitted. Indeed, a variety of signals have been employed in PLC communications. Accordingly, the illustrations of remote and local communication signals 66 and 70 in FIG. 2 are not intended to be restrictive.

Power strip assembly 84 receives power signal 66 through a "hot" conductor 86. Power strip assembly 84 includes sockets 92, 94, and 96, but could include a greater or lesser number of sockets (e.g., only one socket). Sockets 92, 94, and 96 may be considered ports. When a plug associated with a particular electronics device is inserted into a socket, that electronics device may receive power signal 62 from power line 60. Many electronics devices draw current in different levels. When a plug 102 is inserted into socket 94, a minimal amount of current from power line 60 is supplied to television 56A during a standby mode. When a power switch 106 in television 56A is actuated, a significantly larger amount of current is supplied from power signal 62. The amount of current may further vary during operation of the television.

A transmitter, such as infrared (IR) transmitter 110, may transmit a control signal 90 to a receiver 118 in television 56A and VCR 56B under the control of circuitry in power strip assembly 84 and remote computer circuitry 54.

Control signal 90 and other electromagnetic signals in the figures are illustrated only for general reference and are not intended to restrict the electromagnetic signals, the characteristics of which could vary widely depending on the particular transmitters selected. Further, the cones illustrated in dashed lines in the various figures are merely for general reference and are not intended to show the entire extent of the signal.

FIG. 3 illustrates details regarding one of the various ways in which power strip assembly 84 may be implemented. Referring to FIG. 3, power strip assembly 84 includes a local computer 120, which controls IR transmitter 110 and/or other components that control features of an electronics device. Local computer 120 may operate with or without software. Remote computer circuitry 54 communicates with local computer 120 by sending an appropriate remote communication signal 66 through power line interface 64, power line 60, and power line interface 114 in power strip assembly 84. Conversely, local computer 120 communicates with remote computer circuitry 54 through power line interface 114, power line 60, and power line interface 64. Power line interface 114 may include signal insertion and extraction circuitry 116 that inserts and extracts local and remote communication signals 70 and 66 to and from power line 60.

Power signal 62 is conducted through conductor 86 to conductors 92A, 92B, and 92C, which are associated with sockets 92, 94, and 96, respectively. Conductors 92B, 94B, and 96B provide a path to a voltage reference 130 (connected to power line 60).

Referring to FIGS. 2 and 3, a plug is not plugged into socket 96. Accordingly, virtually no current flows through conductor 96A. However, plugs

100 and 102 are plugged into sockets 92 and 94, respectively. If electronics device 56B is in a standby mode, a small amount of alternating current will flow through conductor 92A. If electronics device 56B is in an operating mode, a larger amount of current will flow through conductor 92A.

Current monitoring circuitry 124, 126, and 128 are examples of power consumption sensing circuitry and they provide power state signals 174, 176, and 178 on conductors 144, 146, and 148 that indicate whether the associated electronics devices are drawing current. The magnitudes of the power state signals 174, 176, and 178 on conductors 144, 146, and 148 are related to the amount of current that flows through conductors 92A, 92B, and 92C, respectively. More specifically, a relatively small AC signal is induced by a current sense coil 132 of current monitoring circuitry 124 when an alternating current flows in conductor 92A. The AC signal is half-wave rectified by rectifier diode 134, and filtered with a capacitor 138. Capacitor 138 may be chosen to produce a relatively steady voltage on conductor 144 when current is flowing through conductor 92A. An optional zenor diode 136 provides overvoltage protection. Merely as an example, power state signal 174 changes from a low to a high voltage, power state signal 176 changes from a high to a low voltage, and power state signal 178 remains a low voltage. Depending on how the invention is implemented, the characteristics of power state signals 174, 176, and 178 could vary significantly from those shown in FIG. 3.

Digitizing circuitry 140 converts analog power state signals 174, 176, and 178 to digital signals on conductors 154, 156, and 158 that are received by local computer 120. FIGS. 4A-4D provide four alternative implementations of comparing circuitry 140, although other implementations could be used. Referring

to FIG. 4A, in digitizing circuitry 140 analog to digital (A/D) converters 160, 162, and 164 convert the analog signals on conductors 144, 146, and 148 to digital signals on conductors 154, conductors 156, and conductors 158, respectively. Referring to FIG. 4B, digitizing circuitry 140' includes a single A/D converter 168 that provides a digital signal to conductors 174 (which replace conductors 154, 156, and 158). Conductors 144, 146, and 148 are selected one at a time by selection circuitry 170 under the control of a signal on a conductor 172 from local computer 120. In FIG. 4C, digitizing circuitry 140'' includes comparators 180, 182, and 184 that compare the signals on conductors 144, 146, and 148 with a reference voltage Vref. As an example, if the signal on conductors 144, 146, or 148 exceeds the reference voltage, the corresponding comparator 180, 182, or 184 provides a logical high voltage on a corresponding conductor 186, 188, or 190. Each reference voltage may be identical or there may be some differences among the reference voltages. Referring to FIG. 4D, in digitizing circuitry 140''', a signal comparator 180 compares the signal selected by selection circuitry 170 to a reference voltage.

An A/D converter has the advantage of providing more information regarding the current level than does a comparator. For example, a zero digital signal on conductors 154 could indicate electronics device 56B is not plugged in at all. A relatively small digital signal on conductors 154 could indicate electronics device 56B is in a standby mode. A large digital signal on conductors 154 could indicate the electronics device is in operating mode. Digitizing circuitry 140'' or 140''' may not be able to provide the three levels of information.

Remote computer circuitry 54 and/or local computer 120 may not know whether a particular electronics device is not plugged in or an electronics device

without a standby mode is plugged in. Accordingly, power strip assembly 84 may include detection circuitry that determines whether a plug is in a socket and provides a signal to local computer 120 regarding the same. That information may then be provide to remote computer circuitry 54. For example, such detection circuitry may involve optical, inductive, voltage, capacitive, resistive, and/or mechanical parameters. An electronics device could provide information indicating whether it has a standby mode.

In the embodiment of FIG. 3, local control circuitry 142 includes local computer 120, digitizing circuitry 140, and component driver 150. In other embodiments of the invention, local control circuitry 142 could include somewhat different circuitry.

Local computer 120 creates power state information indicative of the power state signals. Depending on the embodiment of the invention, that power state information may be transmitted through local communication signal 70 to remote computer circuitry 54.

Providing Instructions to the Remote computer

Referring to FIG. 2, instructions for remote computer circuitry 54 to communicate with local computer 120 may be entered into remote computer circuitry 54 in a variety of ways. For example, instructions may be entered through one or more of the following: a keyboard 202, a modem 204, a receiver 206 (such as an IR or radio frequency (RF) receiver), microphone(s) 210, power line 60, or other means. Keyboard 202, modem 204, receiver 206, and microphone 210 may be connected to remote computer circuitry 54 through various ports.

Processing circuitry 68 could include voice recognition capability. For example, if a person wanted to watch a particular television program, he or she could say "Channel 22 7:30PM one hour today" and television 56A would turn on to channel 22 at 7:30 and remain on until 8:30PM. If, television 56A were already on at 7:30PM, it would remain on. Another command could be "Record channel 22 7:30 PM to 8:30 PM next Tuesday." Remote computer circuitry 54 could include or have access to an electronic program guide (EPG). In such a case, a user would say "I want to watch Seinfeld tonight" or "Record Seinfeld tonight." Remote computer circuitry 54 would then determine when "Seinfeld" was on television and turn on television 56B and/or VCR 56B as appropriate. Remote computer circuitry 54 and the electronic equipment could interface with the World Wide Web of the Internet and/or various cable networks allowing greater flexibility of programming. Remote computer circuitry 54 could be used in connection with various universal remote data bases.

Microphones 210 could be located in various places in a house or building allowing greater ease of instructing remote computer circuitry 54. (Networked computers could also be placed in different locations to facilitate instructing remote computer circuitry.) Signals from a microphone could be received through a conductor (as illustrated in FIG. 2), power line 60, receiver 206, or other means. For example, a cordless access device 214 could include a microphone or push button controls and transmit instructions through electromagnetic signals (e.g., IR or RF), to receiver 206.

The present invention may be used in connection with a cluster of CE devices (including, for example, electronics devices 56A and 56B). The present invention may be used in connection with a plug and play protocol. The

invention may be used as part of a home or business intranet. The invention may be used in connection with existing off-the-shelf CE devices such as IR transmitters, televisions, and VCRs, or with electronics devices particularly designed to be used with the present invention.

Information regarding the power state of the electronics device may or may not be transmitted to remote computer circuitry 54. For example, under one embodiment of the invention, remote computer circuitry 54 merely issues a command to local computer 120 to perform a particular function on a particular electronics device. Local computer 120 (and perhaps hardware external to local computer 120) would consider the power state information regarding the power state of the electronics device in determining how to carry out the command. Under another embodiment of the invention, local computer 120 provides power state information to remote computer circuitry 54. Remote computer circuitry 54 considers the power state in determining which instruction(s) to issue to local computer 120.

Additional Illustrated Embodiments

Various components in power strip assembly 84 could be positioned in an electronics device. For example, in FIG. 5A, in a control system 218, local control circuitry 142 and current monitoring circuitry 124 are in electronics device 56C. In such a case, remote computer circuitry 54 could control the state of features in electronics device 56C without IR transmitter 110. Local control circuitry 142 may communicate with remote computer circuitry 54 through power strip assembly 84'. It is not required that both current monitoring circuitry 124 and local control circuitry 142 be in electronics device 56C.

Referring to FIG. 5B, in a control system 220, transmitter 110 may be activated directly by remote computer circuitry 54 rather than by local computer 120.

Referring to FIG. 5C, in a control system 222, internal power line interfaces 64 and 114 may be used in a remote computer circuitry 54' and/or an electronics device 56D. (A power strip is not necessary to all embodiments of the invention, but is merely convenient for use in many embodiments.)

Referring to FIG. 5D, in a control system 224, electromagnetic local and remote communication signals may be sent between remote computer circuitry 54 and a power strip assembly 84'' through a transmitter 230 and receiver 206 and through transmitter 234 and receiver 236, rather than or in addition to power line 60.

Referring to FIGS. 2 and 3, transmitter 110 or another transmitter may be controlled by local computer 120 through component driver 150 and conductor 112. As an option, component driver 150 may also provide signals on a conductor 130A to driver other components such as transmitter 230 in FIG. 5D and/or signals on a conductor 130B to a switch(es) in electronics device. If conductor 130B is used, transmitter 110 may be unnecessary.

FIG. 5E is similar to FIG. 5D except that in a control system 226, transmitter 230 and receiver 236 are controlled from electronics device 56E, rather than from a power strip assembly, and transmitter 110 is not necessary.

FIG. 6 illustrates that a control system 228 in which either of multiple remote computers 56A and 56B can control either of multiple electronics devices 56A and 56B. Other components illustrated in FIGS. 2 and 3 may be internal or external to remote computers 56A and 56B and electronics devices 56A and 56B.

Additional Information and Variations

The components described or illustrated herein may be obtained from known sources and/or constructed according to known techniques. Many well known components are not illustrated or otherwise described to avoid obscuring the invention. For example, power strip assembly 84 would preferably include surge protection circuitry.

Remote computer circuitry 54 may be any of a variety of computers including, but not limited to, personal computers, notebook computers, embedded controllers, and dedicated hardware (which does not use software).

Sense coil 132 could monitor conductor 92B in addition to or instead of conductor 92A. Further, the power consumption sensing circuitry are not required to include current monitoring circuitry that process an induced voltage caused by an alternating current, but rather could monitor inductive, capacitive, resistive, and/or voltage parameters to detect the presence of power consumption. Power line 60 is not restricted to merely wires but may include conductive elements that connect to wires. The invention is not required to include sockets and plugs.

Remote and local communications signals 66 and 70 may be produced by remote computer circuitry 54 and local computer 120 and merely inserted onto power line 60 by power line interfaces 64 or 114. Alternatively, remote and local communication signals 66 and 70 may be generated in whole or in part in power line interfaces 64 and 114 under the control of remote computer circuitry 54 or local computer 120.

In insertion and extraction circuitry 74 and 114, circuitry that inserts a signal onto power line 74 may be physically separated from circuitry that extracts

signals from power line 60. Alternatively, there may be some or complete overlap in circuitry that performs the two functions.

If appropriate circuitry is employed, remote computer circuitry 54 may receive power signal 62 through power line interface 64, rather than through conductor 48.

An "eye patch" device may be used to cover receiver 118 in the electronics device. Under one embodiment, an opaque eye patch device selectively moves in front of the receiver. Under a second embodiment, the eye patch selectively becomes opaque (e.g., a liquid crystal device). The state or position of the eye patch device may be controlled by remote computer circuitry 54 or local computer 120. Information regarding the state or position of the eye patch device may be transmitted to remote computer circuitry 54.

The term "connected" and related terms are used in an operation sense and are not necessarily limited to a direct connection. For example, power line interface 74 is connected to power strip assembly 84, although indirectly through power line 60. Power line 60 is not restricted to merely wires but may include conductive elements that connect to wires.

If the specification states a component "may" or "could" be included, that particular component is not required to be included.

Those skilled in the art having the benefit of this disclosure will appreciate that many other variations from the foregoing description and drawings may be made within the scope of the present invention. Accordingly, it is the following claims including any amendments thereto that define the scope of the invention.

CLAIMS

What is claimed is:

1. A system for controlling a feature of an electronics device which selectively receives a power signal through a conductor, the system comprising:

power consumption sensing circuitry to provide a power state signal indicative of whether the power signal is being provided through the conductor;

local control circuitry to receive the power state signal, create power state information indicative of the power state signal, and provide a feature controlling signal to control the feature; and

remote computer circuitry to receive the power state information from the local control circuitry and considering the power state information to provide a remote communication signal to the local control circuitry including an instruction instructing the local control circuitry to provide the feature controlling signal.

2. The system of claim 1, wherein the remote computer circuitry is a personal computer.

3. The system of claim 1, wherein the remote communication signal and the power state information are communicated over a power line between the remote computer circuitry and the local control circuitry, and between remote and local power line interfaces associated with the remote computer circuitry and the local control circuitry.

4. The system of claim 1, wherein the remote communication signal and the power state information are transmitted as electromagnetic signals through air between the remote computer circuitry and the local control circuitry.

5. The system of claim 1, wherein the remote computer circuitry includes voice recognition circuitry and considers voice signals processed therein in deciding on the instruction to include.

6. The system of claim 1, wherein the remote computer circuitry has access to an electronic program guide (EPA) and consults with the EPA in deciding on the instruction to include.

7. The system of claim 1, further comprising an infrared transmitter to receive the feature controlling signal and transmit an infrared signal to the electronics device to control the feature.

8. The system of claim 1, wherein the feature controlling signal is provided on a conductor to the electronics device.

9. The system of claim 1, wherein the power consumption sensing circuitry and the local control circuitry are including in the electronics device.

10. The system of claim 1, wherein a magnitude of the power state signal is indicative of a magnitude of the power signal being provided through the conductor and the remote computer circuitry considers the magnitude in deciding on the instruction to include.

11. The system of claim 1, further comprising the electronics device.

12. The system of claim 1, wherein the power consumption sensing circuitry includes current monitoring circuitry having a current sense coil around a portion of the conductor.

13. The system of claim 1, further comprising an additional conductor and additional power consumption sensing circuitry to provide an additional power state signal indicative of whether an additional power signal is being

provided through the additional conductor to an additional electronics device, and wherein the local control circuitry receives the additional power state signal.

14. The system of claim 1, wherein the power consumption sensing circuitry and the local control circuitry are included in a power strip assembly.

15. The system of claim 1, wherein the remote computer circuitry includes physically separated circuitry.

16. The system of claim 1, wherein the system controls more than one feature of the electronics device, the remote computer circuitry has multiple instructions from which to choose and in at least some cases considers the power state information in determining which of the instructions to include in the remote communication signal, and wherein for some of the features, the remote communication signal includes more than one instruction to instruct the local control circuitry.

17. A system for controlling a feature of an electronics device which selectively receives a power signal through a conductor, the system comprising:

power consumption sensing circuitry to provide a power state signal indicative of whether the power signal is being provided through the conductor;

local control circuitry to receive the power state signal, create power state information indicative of the power state signal, and provide a feature controlling signal to control the feature; and

remote computer circuitry to provide a remote communication signal to the local control circuitry including an instruction instructing the local control circuitry to provide the feature controlling signal, the local control circuitry considering the power state information in determining how to respond to the instruction.

18. The system of claim 17, wherein the remote communication signal is communicated over a power line between the remote computer circuitry and the local control circuitry.

19. The system of claim 17, wherein the remote computer circuitry includes voice recognition circuitry and considers voice signals processed therein in deciding on the instruction to include.

20. The system of claim 17, wherein a magnitude of the power state signal is indicative a magnitude of the power signal being provided through the conductor and the local control circuitry considers the magnitude in deciding on how to respond to the instruction.

21. The system of claim 17, further comprising the electronics device.

22. A system for controlling a feature of an electronics device which selectively receives a power signal through a conductor, the system comprising:

power consumption sensing circuitry to provide a power state signal indicative of whether the power signal is being provided through the conductor;

local control circuitry to receive the power state signal and create power state information indicative of the power state signal; and

remote computer circuitry to receive the power state information from the local control circuitry and considering the power state information to provide a control signal to control the feature.

23. A power strip assembly for use in a system for controlling a feature of an electronics device which selectively receives a power signal through a conductor, the assembly comprising:

power consumption sensing circuitry to provide a power state signal indicative of whether the power signal is being provided through the conductor; and

local control circuitry to receive the power state signal and create power state information indicative of the power state signal.

24. The system of claim 23, wherein the local control circuitry provides a feature controlling signal to control the feature.

25. The system of claim 23, further including a power line interface and wherein a signal including the power state information is transmitted by the power line interface to a power line.

26. Remote computer circuitry for use in a system for controlling a feature of an electronics device which selectively receives a power signal through a conductor, the remote computer circuitry comprising:

a port for receiving a communication signal including power state information indicative of whether the electronics device is receiving the power signal through the conductor; and

processing circuitry to receive the power state information and considering the power state information to provide a control signal to control the feature.

27. The remote computer circuitry of claim 26, wherein the control signal is a communications signal including an instruction to control the feature.

28. The remote computer circuitry of claim 26, wherein the remote computer circuitry is a personal computer.

29. A method for controlling a feature of an electronics device which selectively receives a power signal through a conductor, comprising:

determining whether the electronics device is receiving the power signal;

transmitting power state information indicative of whether the electronics device is receiving the power; and

considering the power state information, providing a control signal to control the feature.

1/6

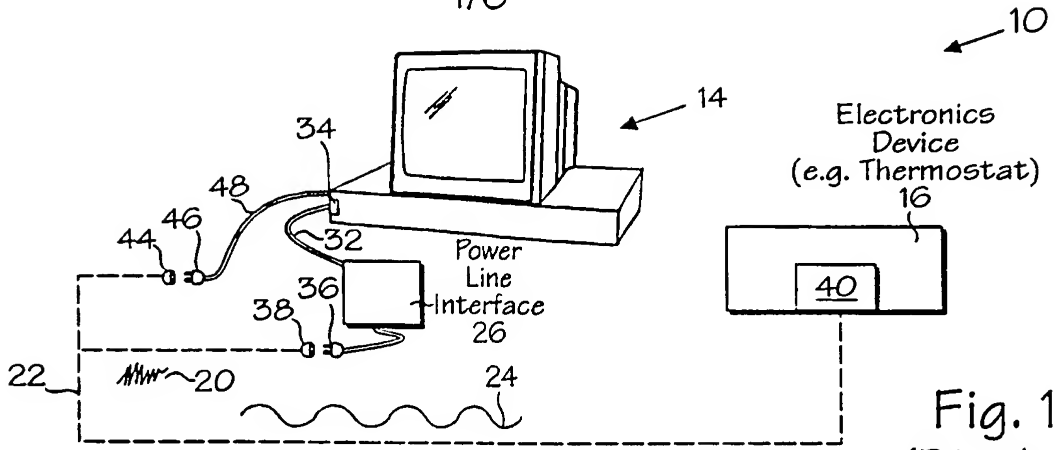


Fig. 1
(Prior Art)

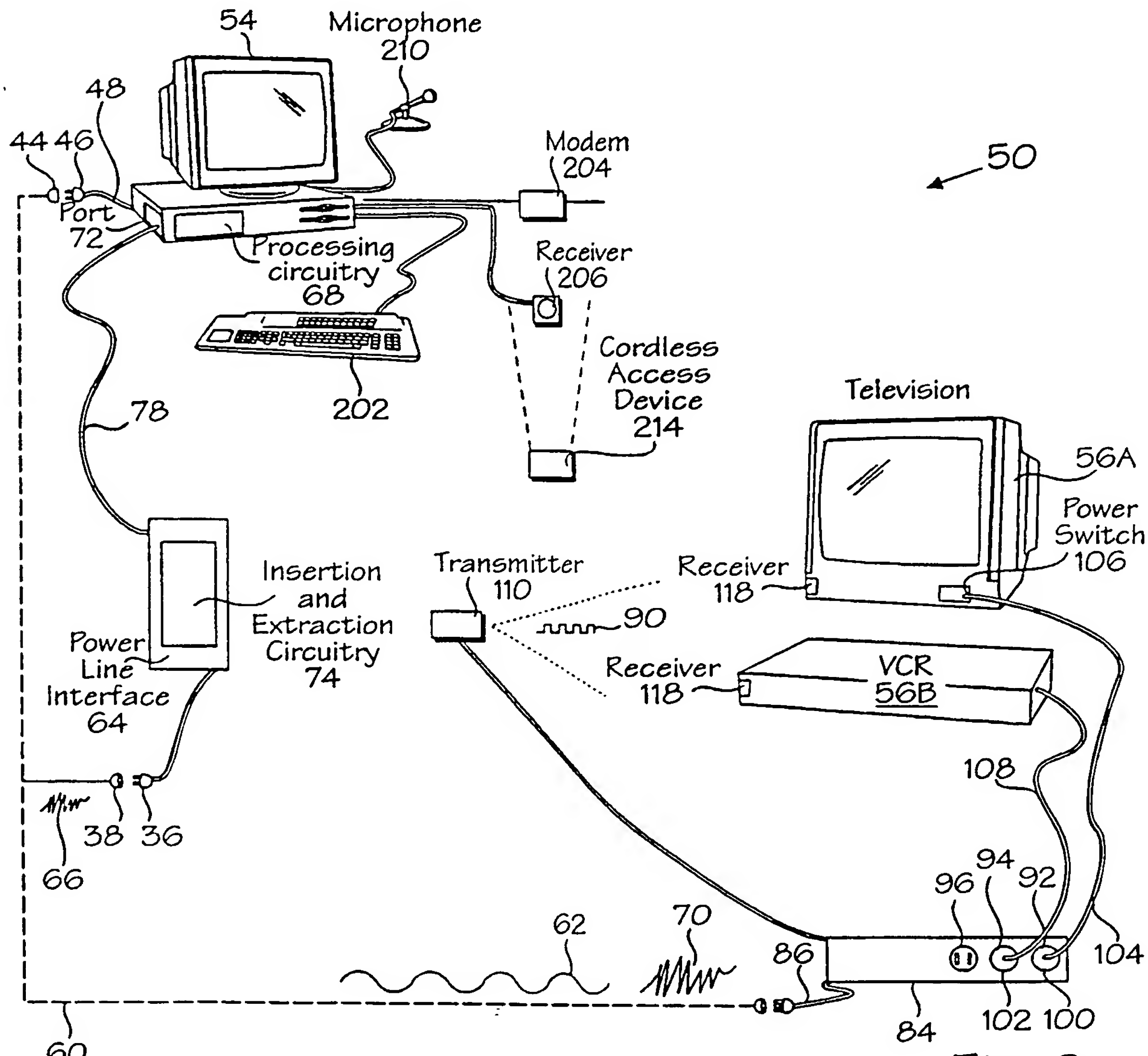
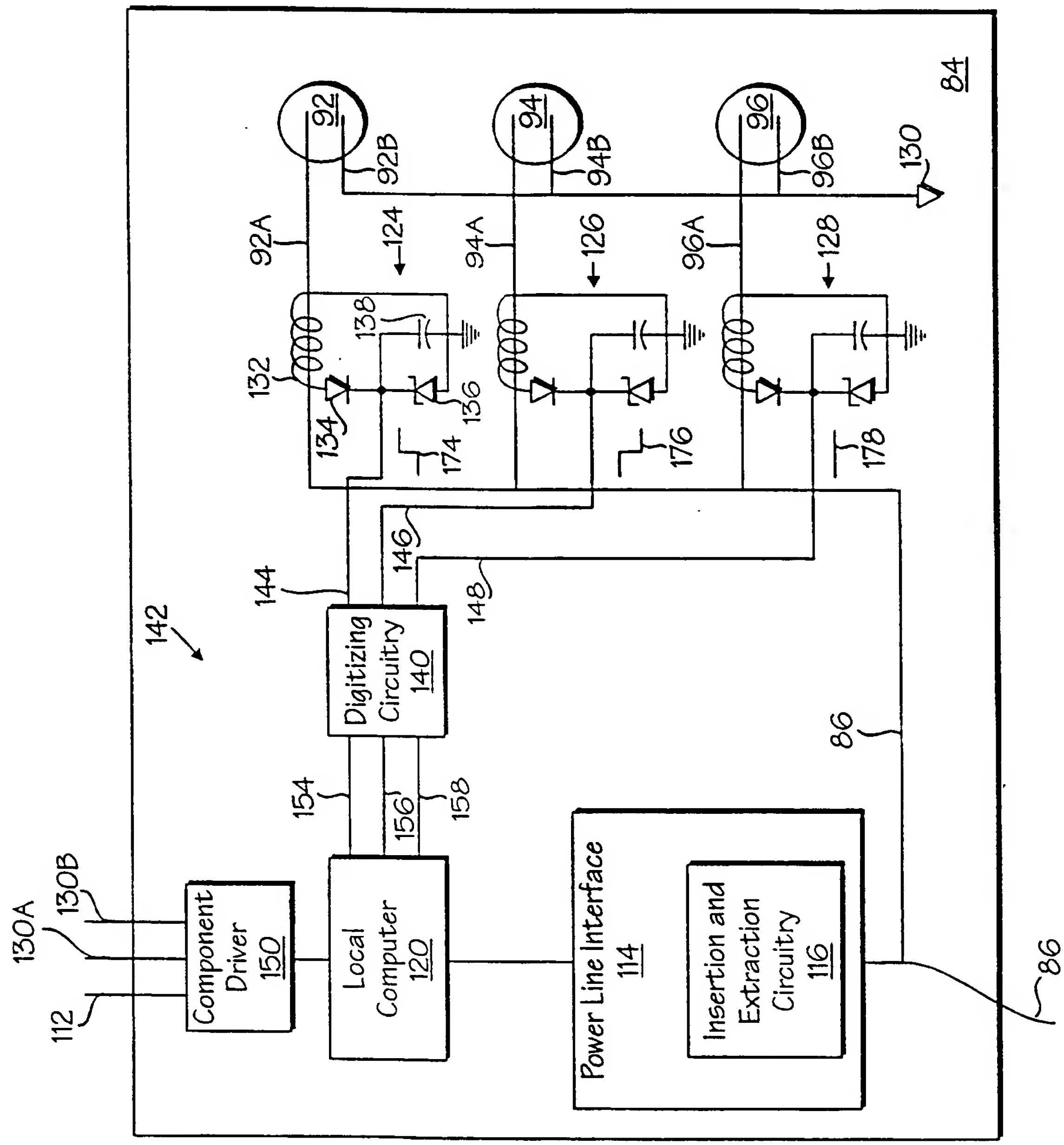


Fig. 2

Fig. 3


92
94
96
84
92B
94B
96B
130
92A
94A
96A
124
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138
174
176
178
144
146
148
142
Digitizing Circuitry 140
154
156
158
86
Component Driver 150
Local Computer 120
Power Line Interface 114
Insertion and Extraction Circuitry 116
130A
130B
112
86

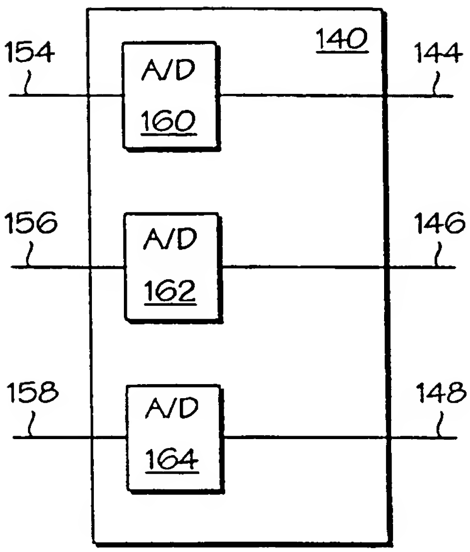

Fig. 4A

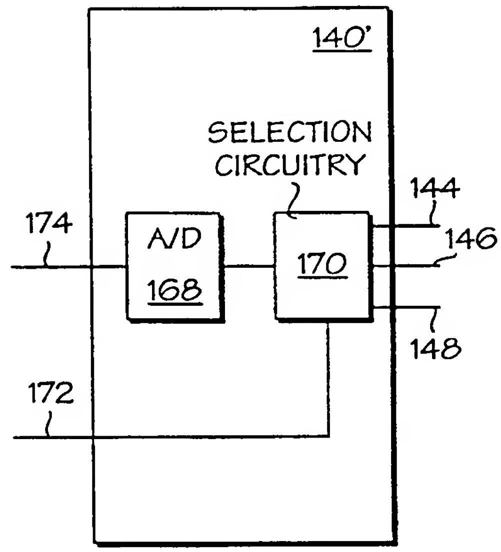

Fig. 4B

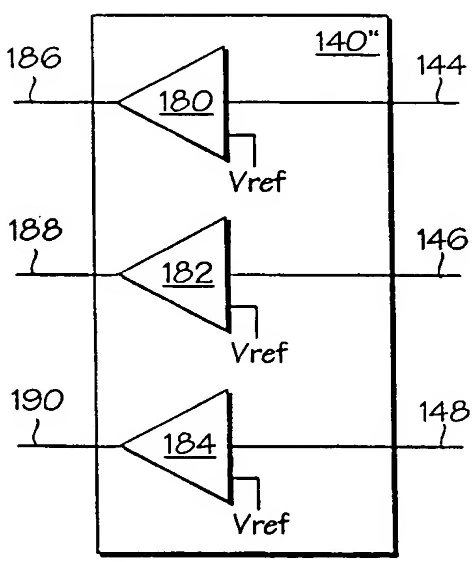

Fig. 4C

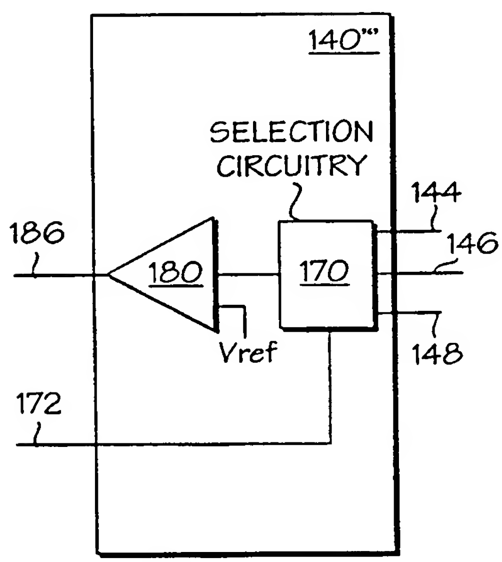

Fig. 4D

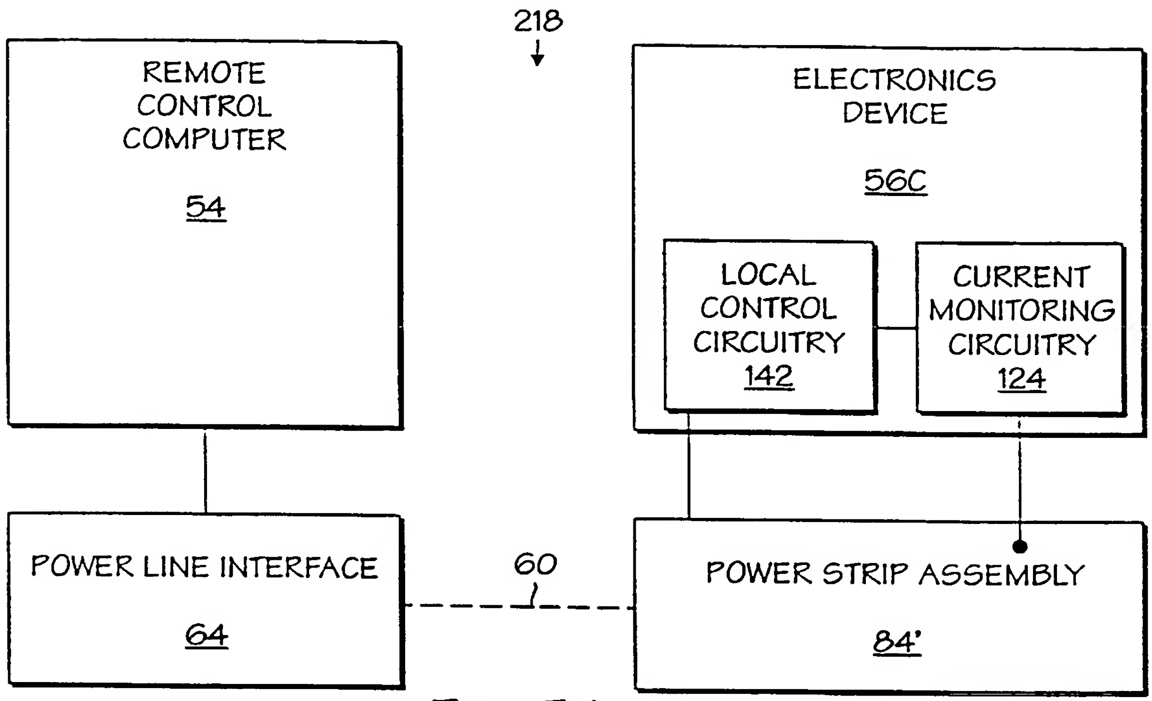
218
REMOTE CONTROL COMPUTER
54
ELECTRONICS DEVICE
56C
LOCAL CONTROL CIRCUITRY
142
CURRENT MONITORING CIRCUITRY
124
POWER LINE INTERFACE
64
60
POWER STRIP ASSEMBLY
84'

Fig. 5A

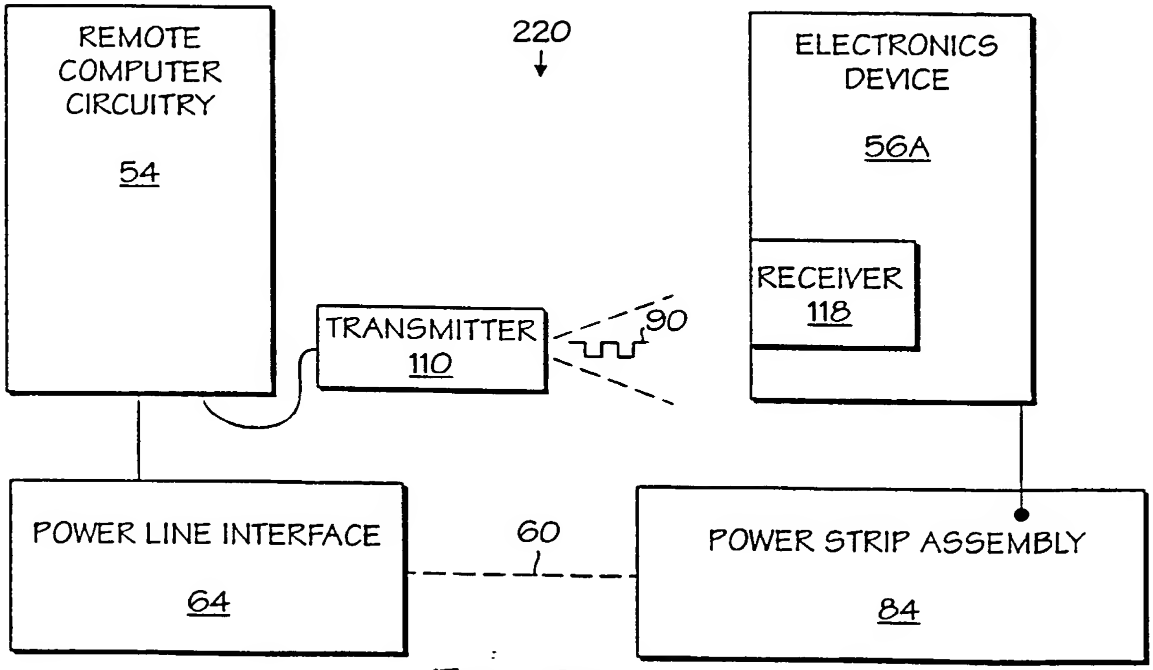
220
REMOTE COMPUTER CIRCUITRY
54
ELECTRONICS DEVICE
56A
RECEIVER
118
TRANSMITTER
110
90
POWER LINE INTERFACE
64
60
POWER STRIP ASSEMBLY
84

Fig. 5B

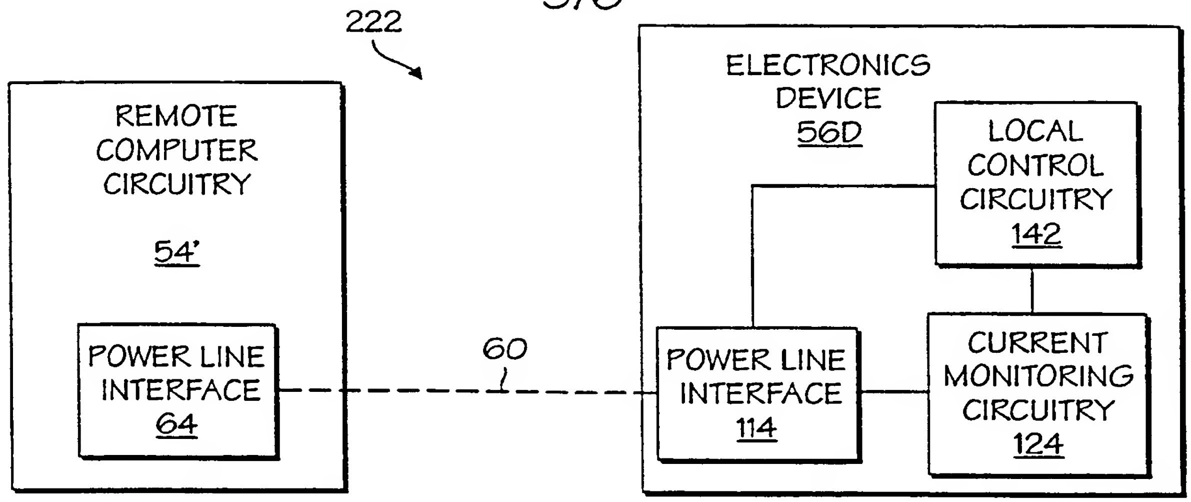

Fig. 5C

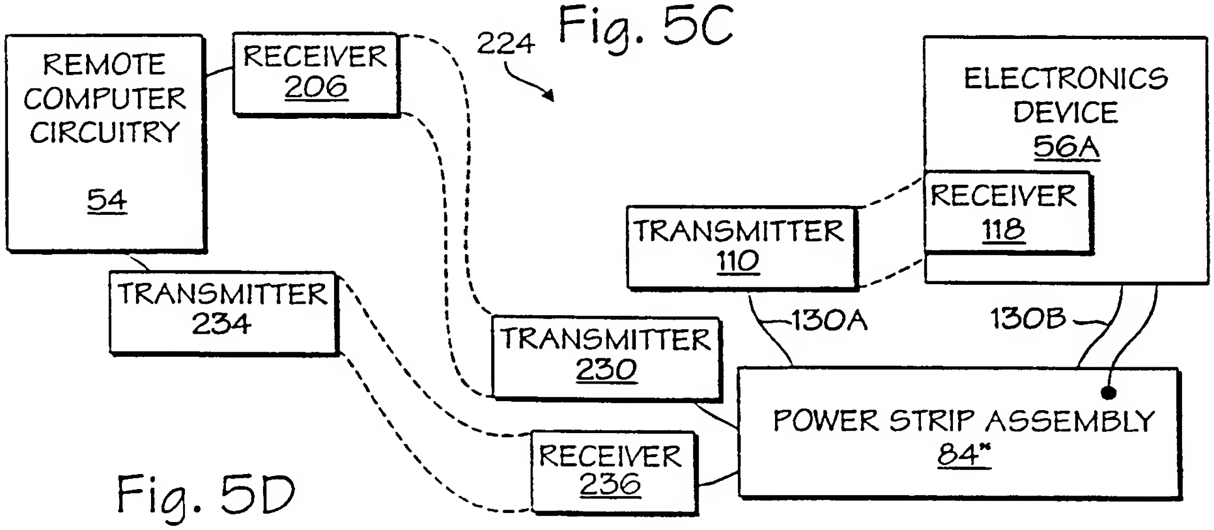

Fig. 5D

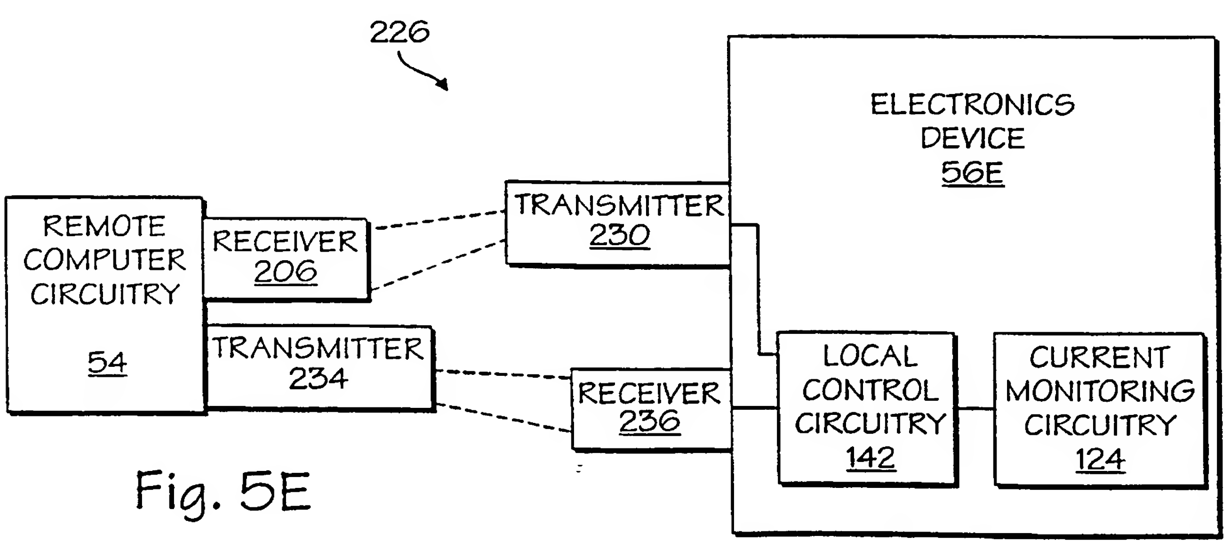

Fig. 5E

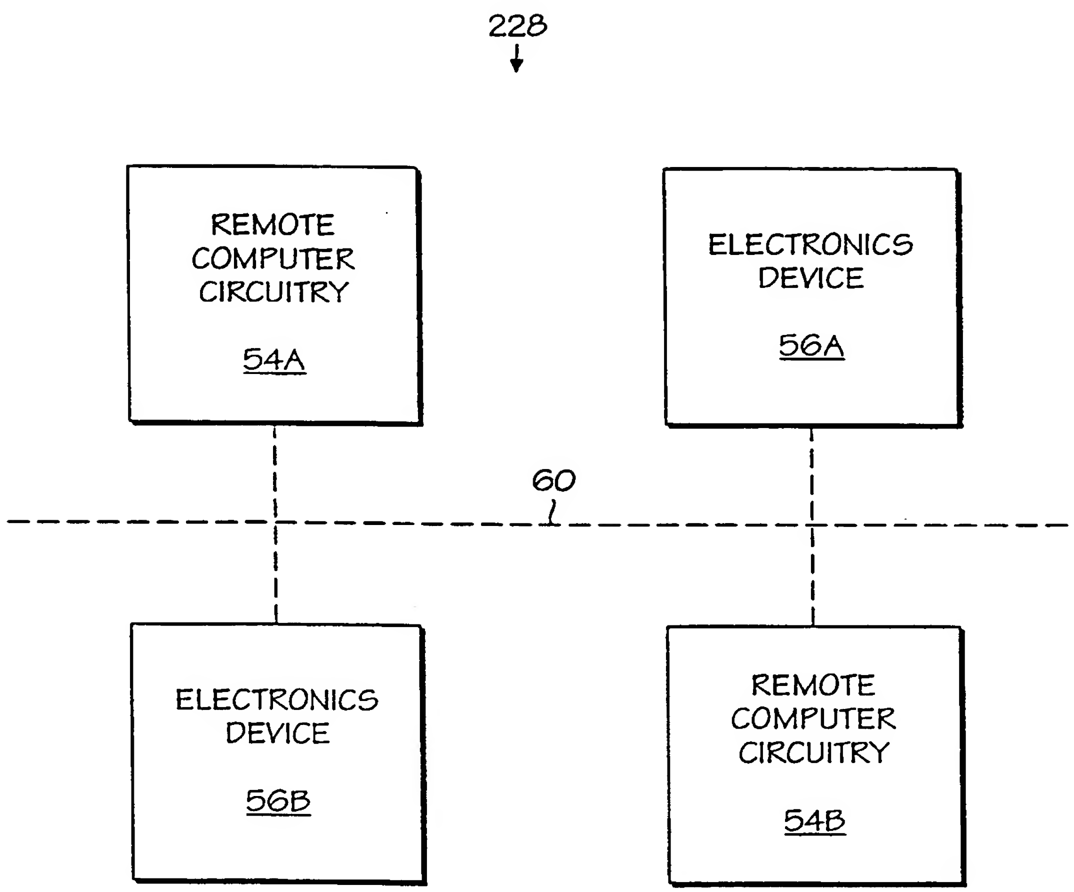
228
REMOTE COMPUTER CIRCUITRY
54A
ELECTRONICS DEVICE
56A
60
ELECTRONICS DEVICE
56B
REMOTE COMPUTER CIRCUITRY
54B

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/08151

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04M 11/04; H02J 1/00; H01H 35/00
US CL :340/310.01; 307/38, 126
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 340/310.01-310.08; 307/31-41, 116, 125, 126

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,097,249 A (Yamamoto) 17 March 1992 (17.03.1992), figures 1-4.	1-29
Y	US 4,418,333 A (Schwarzbach et al.) 11 November 1983 (11.11.1983), figures 1-6.	1-29
Y	US 5,424,587 A (Federowicz) 13 June 1995 (13.06.1995), figures 14-16.	5
X	US 5,495,295 A (Long) 27 February 1996 (27.2.1996), see the entire document.	6

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
	10 AUG 1998

Name and mailing address of the ISA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	JONATHAN S. Kaplan
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet)(July 1992)★